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FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

SUMMARY

Agenda Item: D.11.1

India

INDUSTRIAL DEVELOPMENT : SCIENTIFIC AND TECHNICAL FACTORS IN CHOICE OF FERTILISERS AND RAW MATERIALS

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UNITED NATIONS CONFERENCE
ON
THE APPLICATION OF SCIENCE AND TECHNOLOGY
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Agenda Item : D : INDUSTRIAL DEVELOPMENT.

D.11.1 Scientific and technical factors in choice of fertilisers and raw materials.

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SUMMARY

1. Fertilisers are required for increasing the productivity of land for obtaining greater yields of foodgrains and cash crops. The term 'fertiliser' is applied usually to products that contribute plant nutrients such as N,P,& K, as distinct from manures which also contain organic matter.

2. Fertilisers may provide either one or more plant nutrients. Nitrogenous fertilisers containing nitrogen alone are ammonium sulphate, urea, ammonium nitrate, nitro-chalk, ammonium sulphate-nitrate and ammonium chloride. Latterly, there is a growing tendency to use ammonia directly either as gas or as ammonia liquor. It is necessary to ensure that fertiliser nitrogen is available to soils throughout the period of germination of the seed and its subsequent growth to a plant. Among single nutrient phosphatic fertilisers are ground rock phosphate, single and triple superphosphate, di-calcium phosphate and basic slag. The choice will depend upon the price per unit of P_2O_5 available in the fertiliser.

3. Both the nutrients N & P are provided by mixed and granulated fertilisers or by complex fertilisers. Among the latter are mono and di-ammonium phosphate and nitro-phosphates. Nitro-phosphates may be produced in different forms and with varying proportions of water soluble P_2O_5. The need to avoid the use of sulphur in the production of phosphatic fertilisers that led to the development of Nitro-phosphates may not be equally urgent now.

4. Phosphate rock is the usual raw material for phosphatic fertilisers. It is available in many parts of the world but many countries also depend on imports. There is considerable controversy regarding the merits of single and tripe superphosphate and also on the effectiveness of water and citrate

soluble phosphates. In acid soils and for long standing crops, citrate soluble phosphates are satisfactory. For basic soils and short-term crops, water soluble phosphates are more effective. Response to phosphatic fertilisers is slower than that with nitrogenous fertilisers. It is, therefore, necessary to build up the phosphate content of soils. The ratio of added nitrogen to phosphorus in advanced countries often exceeds 1:1. In developing countries the demand for nitrogen develops more rapidly.

5. Production of synthetic ammonia is the first step in the manufacture of fertilisers. Synthesis gas consisting of nitrogen and hydrogen in the ratio of 1:3 is necessary for this purpose. Hydrogen is obtained from coke oven gas or as electrolytic hydrogen; it can also be made by chemical reactions employing natural gas, petroleum refinery gas, naphtha or fuel oil, or by gassification of coal, coke or wood. The choice depends on indigenous availability as well as on the price of the raw material.

6. The changing trends in types of fertilisers and choice of raw materials are reflected in the current fertiliser programmes in India. Gassification of wood will no longer be employed for the production of fertilisers. Electrolytic hydrogen as well as coke may not be used as raw materials for the production of hydrogen in new projects, because of high cost and unavailability. While refinery gases and naphtha will be used as raw materials to an increasing extent, coal will also be used. Ammonium sulphate, urea and ammonium phosphate appear to be the most popular fertilisers.

7. A summary of the existing and new fertiliser projects in the Third Five Year Plan is given in tabular form in Table II.

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